



UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/736,602	12/17/2003	Michael A. Kneissl	115917	5826

65575 7590 03/29/2007
OLIFF & BERRIDGE, PLC
P.O. BOX 19928
ALEXANDRIA, VA 22320

EXAMINER

GOLUB, MARCIA A

ART UNIT	PAPER NUMBER
----------	--------------

2828

SHORTENED STATUTORY PERIOD OF RESPONSE	MAIL DATE	DELIVERY MODE
3 MONTHS	03/29/2007	PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

If NO period for reply is specified above, the maximum statutory period will apply and will expire 6 MONTHS from the mailing date of this communication.

Office Action Summary	Application No. 10/736,602	Applicant(s) KNEISSL ET AL.	
	Examiner Marcia A. Golub	Art Unit 2828	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 09 March 2007.
- 2a) ☒ This action is FINAL. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-32 and 51-62 is/are pending in the application.
 4a) Of the above claim(s) 4-6, 9-17, 21-24, 27, 31 and 32 is/are withdrawn from consideration.
- 5) ☒ Claim(s) 52-62 is/are allowed.
- 6) ☒ Claim(s) 1-3, 7, 8, 18-20, 25, 26, 28-30 and 51 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
 Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
 Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
 a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Response to Arguments

Applicant's arguments filed 3/9/07 have been fully considered but they are not persuasive. Regarding applicant's argument that the resonator in Fig 8 consists of only one layer, the examiner points out that if that were the case the resonator would not be able to produce any output. It is notoriously well known to anyone skilled in the art that a resonator requires an active region and two confining regions to produce output. In the case of a semiconductor resonator those regions are cladding layers. Fig 7 is used merely as an illustration of the active and cladding layers omitted from Fig 8. The rejection does not combine two different embodiments as erroneously noted by the applicant. Fig 8 illustrates a solution to couple out light perpendicularly to the plane of the resonator, while Fig 7 illustrates the basic structure of the resonator.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 1, 2, 7, 18, 19, 28 and 29, 51 are rejected under 35 U.S.C. 103(a) as being unpatentable over McCall (5,343,490) hereinafter '490, and further in view of Kinoshita (6,330,265) hereinafter '265.

Regarding **claim 1**, Figs 7 and 8 of '490 disclose "a grating-outcoupled microcavity disk resonator [70,80], defining a plane [81, 82] and having a substantially smooth curved outer periphery [83] (9/55-56), bounded by reflective walls, around and within which light can circulate (3/36-38); the resonator including:

a quantum-well active layer [71];

at least one other layer [72]; and

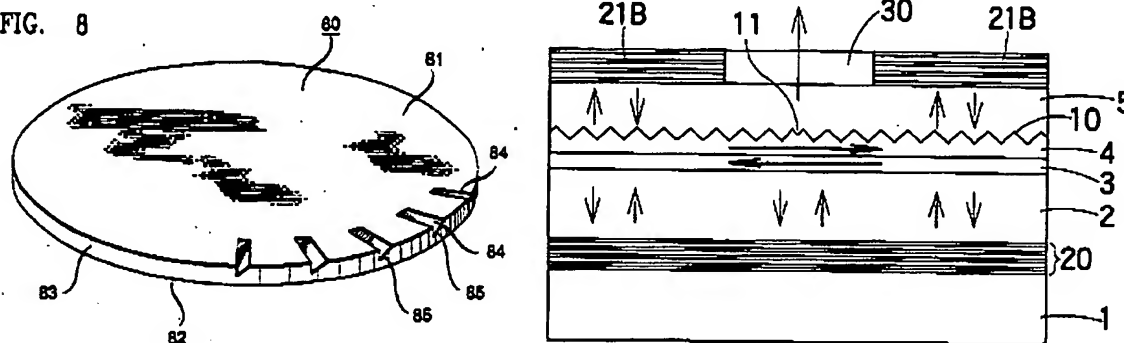
at least one grating region [84] disposed in the plane [81] of the grating-outcoupled microcavity disk resonator [70,80]; the grating region [84] serving to

outcouple light circulating within the curved outer periphery into free space modes propagating out of the plane of the resonator.” (11/22-23)

‘490 does not disclose that the grating region “is a buried grating that has a substantially symmetric profile”. However, Fig 2a of ‘265 discloses a grating with a sawtooth profile located in the waveguide and cladding layers of the laser.

It would have been obvious to one of ordinary skill in the art at the time of the invention to incorporate the teachings of ‘265 into the device of ‘490 by making the buried grating with a substantially symmetric profile located in the waveguide and cladding layers for at least the purpose of outcoupling light circulating in both clockwise and counterclockwise directions.

FIG. 8



Regarding **claims 2, 7, 18, 19, 28 and 29, 51**, Figs 7 and 8 of ‘490 and Fig 2A of ‘265 disclose a grating-outcoupled microcavity disk resonator as described above:

2. “wherein the grating region [10] is a set of periodic features formed in or on a cladding layer [5] included in at least one other layer of the resonator.”
7. “wherein the grating region forms at least a second order grating.” (title of Fig 2a)
18. “wherein the grating region [10] is a set of periodic features formed in an upper cladding layer [5] included in at least one other layer of the resonator.”
19. “wherein the grating region [10] is formed in an upper cladding layer [5] and an upper waveguide layer [4] included in at least one other layer of the resonator.”
- 28, 29. “wherein the grating-outcoupled cavity resonator comprises a heterostructure formed using at least one of InP (claim 28) and InGaAsP (claim 29).” (7/27-29 of ‘490)
51. “further comprising: a first waveguide layer [72]; and a second waveguide layer [72] on the other side of the quantum-well active layer from the first waveguide layer.”

Claim 3 is rejected under 35 U.S.C. 103(a) as being unpatentable over '490 and '265 as applied to claim 1 above, and further in view of Hwang et al. (6,638,773) hereinafter '773.

Regarding **claim 3**, '490 and '265 disclose a grating-outcoupled microcavity disk resonator as described above, but do not disclose "wherein the periodic features have at least one of a trapezoidal, rectangular, and sinusoidal shape."

However, different shapes of gratings in semiconductor lasers are well known in the art as evidenced by '773 (16/61-65).

It would have been obvious to one of ordinary skill in the art at the time the of the invention to make the grating of these known shapes, since it has been held to be within the general skill of a worker in the art to select a known material/element on the basis of it's suitability for the intended use as a matter of obvious design choice. *In re Leshin*, 227 F.2d 197, 125 USPQ 416 (CCPA 1960).

Claim 8 is rejected under 35 U.S.C. 103(a) as being unpatentable over '490 and '265 as applied to claim 1 above, and further in view of Baird et al. (5,559,824) hereinafter '824.

Regarding **claim 8**, '490 and '265 disclose a grating-outcoupled microcavity disk resonator as described above, but do not disclose "that the grating region forms at least a distributed feedback grating."

However, DFB gratings in semiconductor lasers are well known in the art as evidenced by '824 (6/29-47).

It would have been obvious to one of ordinary skill in the art at the time of the invention to incorporate the teachings of '824 into the device of '490 and '265 by making a grating in the microcavity disk resonator a DFB grating for at least the purpose of controlling the spectral bandwidth and wavelength of the output.

Claim 20 is rejected under 35 U.S.C. 103(a) as being unpatentable over '490 and '265 as applied to claim 1 above, and further in view of Portnoi et al. (6,219,369) hereinafter '369.

Regarding **claim 20**, '490 and '265 disclose a grating-outcoupled microcavity disk resonator as described above, but do not disclose that the grating is formed of two

Art Unit: 2828

gratings, one in the top cladding layer and the other one in the bottom cladding layer. However, Fig 1 of '369 discloses: "wherein the grating region [10, 11] is formed in both a top cladding layer [p-type layer] included in at least one other layer and a bottom cladding layer[n-type layer] of the resonator [1].

It would have been obvious to one of ordinary skill in the art at the time of the invention to incorporate the teachings of '369 into the device of '490 and '265 by positioning the grating in both the top and the bottom cladding layer for at least the purpose of providing a distributed feedback and increasing output efficiency of the laser.

Claims 25, 26 and 30 are rejected under 35 U.S.C. 103(a) as being unpatentable over '490 and '265 as applied to claim 1 above.

Regarding **claims 25, 26 and 30**, '490 and '265 disclose a grating-outcoupled microcavity disk resonator as described above, but do not disclose "that the grating-outcoupled microcavity disk resonator comprises a III-V nitride semiconductor heterostructure formed on a substrate (claim 25); wherein the substrate comprises at least one of sapphire, silicon carbide, GaN, AlGaIn, AlN, and silicon (claim 26); wherein the grating-outcoupled microcavity disk resonator comprises a heterostructure formed using at least one of ZnSe, CdS, MgS, MgSe, CdSe, CdTe, ZnO, and MgO" (claim 30).

However, these materials/elements are well known in the art of lasers.

It would have been obvious to one of ordinary skill in the art at the time the of the invention to make the laser of these known materials/elements, since it has been held to be within the general skill of a worker in the art to select a known material/element on the basis of it's suitability for the intended use as a matter of obvious design choice. *In re Leshin*, 227 F.2d 197, 125 USPQ 416 (CCPA 1960).

Allowable Subject Matter

Claims 52-62 are allowed.

The following is an examiner's statement of reasons for allowance: The prior art of record does not disclose a microcavity disk resonator with the layers and materials disclosed in the claims.

Any comments considered necessary by applicant must be submitted no later than the payment of the issue fee and, to avoid processing delays, should preferably

Art Unit: 2828

accompany the issue fee. Such submissions should be clearly labeled "Comments on Statement of Reasons for Allowance."

Conclusion

Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within **TWO MONTHS** of the mailing date of this final action and the advisory action is not mailed until after the end of the **THREE-MONTH** shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than **SIX MONTHS** from the date of this final action.

Contact Info


Any inquiry concerning this communication or earlier communications from the examiner should be directed to Marcia A. Golub whose telephone number is 571-272-8602. The examiner can normally be reached on M-F 9-6 pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Minsun Harvey can be reached on 571-272-1835. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Marcia A. Golub
Assistant Examiner
Art Unit 2828

MAG


MINSUN OH HARVEY
PRIMARY EXAMINER